

UK Patent Application GB 2 324 360 A

(43) Date of A Publication 21.10.1998

(21) Application No 9807758.9

(22) Date of Filing 08.04.1998

(30) Priority Data

(31) 19716199

(32) 18.04.1997

(33) DE

(51) INT CL⁶
F41G 3/14

(52) UK CL (Edition P)
F3C CGB

(56) Documents Cited

GB 2107835 A
EP 0261091 A2

GB 1563094 A
US 4202246 A

GB 1419471 A
US 4015258 A

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(58) Field of Search
UK CL (Edition P) F3C CAH CGB CGX
INT CL⁶ F41G
ONLINE: WPI

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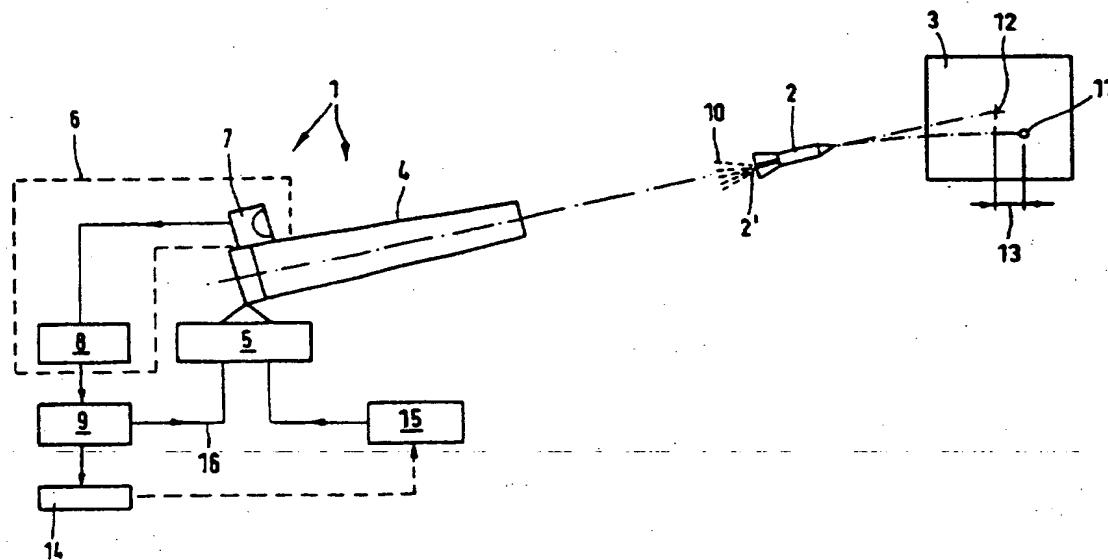
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(54) Abstract Title

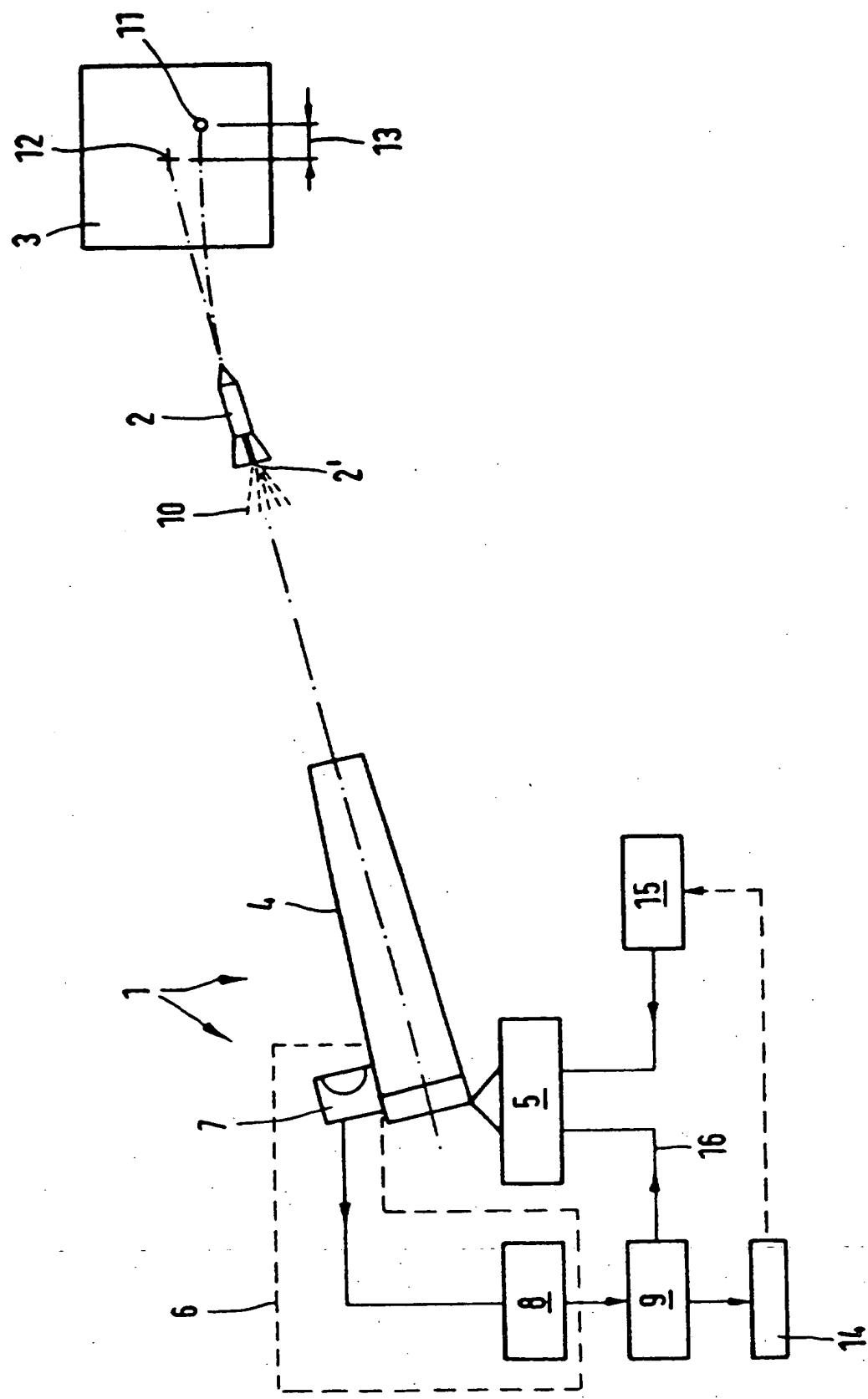
Method and apparatus for aiming a weapon

(57) Method for aiming a weapon (4) in an installation (1) having an aiming apparatus (5) and a heat imaging apparatus (6) and which takes into account extraneous influences on the projectile (2) fired at a target (3). In the method the lateral deviation (13) of the impact point (11) of the projectile from the desired impact point (12) is determined by measuring a tracer (10) in a projectile (2) using the heat imaging apparatus (6). The deviation (13) thus determined is compensated for in a subsequent firing sequence using an appropriate lateral aiming correction applied to the weapon (4).



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TITLE

Method and Apparatus for Aiming a Weapon

05 This invention relates to a method and apparatus for aiming a weapon in an armoured installation with an aiming apparatus and a heat imaging apparatus. This invention also relates to an armoured installation for the performance of the method.

10 The accuracy of a projectile fired from an armoured installation such as a combat tank depends on a number of parameters. The prevailing weather conditions in particular have a considerable effect on the trajectory of the projectile. A frequent occurrence is a hit being made to one side of the preselected point in consequence of a side wind. It has therefore been proposed that the armoured installation should be 15 equipped with an anemometric apparatus and the measured results obtained, being the direction and force of the wind, taken into account when the weapon is being aimed.

20 At the usual combat ranges for tanks, which is 2000 to 3000 m, the correction values measured by an anemometric apparatus mounted on the tank nevertheless do not provide adequate information. In particular, when the tank is in a protected position, the wind conditions prevailing over the total path of the projectile may be completely different from those prevailing on the site occupied by the tank.

25 One object of this invention is to provide a method of aiming a weapon, particularly one carried by a vehicle, wherein factors affecting

the lateral deviation of the projectile, such as atmospheric conditions, can be taken into account in order to improve the accuracy of the subsequent firing sequence. This invention also seeks to provide an armoured installation for carrying out the process.

05 According to this invention there is provided a method for aiming a weapon of an armoured installation using an aiming apparatus and a heat imaging apparatus, in which method an aiming reference point is determined at a target and a tracer projectile thereafter fired from the weapon, the flight path of the tracer projectile being tracked using a heat imaging apparatus; from the tracer image detected by the heat imaging apparatus and using an evaluation device the lateral deviation of the point of impact of the tracer projectile on the target from the preselected aiming point being determined, and the deviation value ascertained being displayed and/or transmitted to the aiming apparatus in order to adjust the aim of the weapon.

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According to this invention there is also provided an installation for firing projectiles from a weapon having an aiming apparatus coupled to the weapon for adjustment thereof and with a heat imaging apparatus directed towards a target, the heat imaging apparatus being connected with an evaluation apparatus which, in combination with a tracer projectile, determines from the tracer, as detected by the heat imaging apparatus, the deviation of the impact point of the projectile on the target from a preselected aiming point to generate a corresponding signal defining the deviation.

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25 The principle on which this invention is based is that of determining

any potential lateral deviation of the impact point of a projectile from a preselected aiming point by assessing the path traced by the projectile using a heat imaging apparatus. The lateral deviation thus determined is then counteracted in a subsequent firing sequence by means of a lateral aim correction process.

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The method of this invention can be applied in a simple and economical manner, particularly to weapon systems carried by combat tanks, because such armoured installations are already equipped with an aiming system and generally also with a heat imaging apparatus.

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In one advantageous version of this invention the weapon only fires tracer projectiles and this makes it possible for the weapon to be continually adjusted to a reference point which, for example, is preselected by the marksman.

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further features and advantages of this invention will now be described by reference to the drawing and an embodiment shown therein as example.

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Referring to the drawing there is shown schematically an armoured installation 1, a tracer projectile 2 which has been fired from the installation 1 and having a tracer composition 2 in the tail end, and a target 3 which has been rotated 90° into the plane of vision. The target here is the turret of a tank shown in plan view.

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The installation 1 includes a gun 4, an aiming apparatus 5 mechanically coupled to the gun and a heat imaging apparatus 6 with an optical unit 7 connected to an electronic system 8. The electronic system 8 of the apparatus 6 is connected to an evaluation device 9 which

automatically follows the tracer image 10 detected by the heat imaging apparatus 6 and compares the impact point 11 on the target 3 with the required impact point 12 selected by the marksman and determines from these values the lateral deviation 13. The lateral deviation 13
05 determined by the evaluation device 9 is then shown on a display apparatus 14.

In a first alternative the marksman can adjust the aiming apparatus 5 manually by means of a device 15 using the deviation values 13 displayed to make the required correction to the position of the gun 4.

10 In a second alternative appropriate signals are obtained from the evaluation device 9 from the deviation values 13 ascertained and these are transmitted through a line 16 to the aiming apparatus 5 to enable the gun 4 to follow-up automatically to the required aiming point 11.

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CLAIMS

1. Method for aiming a weapon of an armoured installation using an aiming apparatus and a heat imaging apparatus, in which method an aiming reference point is determined at a target and a tracer projectile thereafter fired from the weapon, the flight path of the tracer projectile being tracked using a heat imaging apparatus; from the tracer image detected by the heat imaging apparatus and using an evaluation device the lateral deviation of the point of impact of the tracer projectile on the target from the preselected aiming point being determined, and the deviation value ascertained being displayed and/or transmitted to the aiming apparatus in order to adjust the aim of the weapon.
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2. Method in accordance with Claim 1, wherein only tracer projectiles are fired from the weapon, the deviation values measured by the evaluation device being continually fed as correction values to the aiming apparatus.
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3. Installation for firing projectiles from a weapon having an aiming apparatus coupled to the weapon for adjustment thereof and with a heat imaging apparatus directed towards a target, the heat imaging apparatus being connected with an evaluation apparatus which, in combination with a tracer projectile, determines from the tracer, as detected by the heat imaging apparatus, the deviation of the impact point of the projectile on the target from a preselected aiming point to generate a corresponding
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signal defining the deviation.

4. Installation in accordance with Claim 3, wherein the evaluation apparatus is connected through a line with the aiming apparatus whereby the signal values corresponding to the deviation are used directly for controlling the aiming apparatus.

5. Installation in accordance with Claim 3 or 4, wherein the evaluation device is connected with a display unit on which the deviation is indicated.

10 6. A method for aiming, or correcting the aim, of a weapon preferably being part of an armoured installation, carried out substantially as described herein and illustrated with reference to the drawings.

15 7. An installation, preferably armoured, and including a weapon being substantially as herein described and illustrated with reference to the drawings.

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Application No: GB 9807758.9
Claims searched: 1 to 7

Examiner: Trevor Berry
Date of search: 4 June 1998

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.P): F3C CAH, CGB, CGX

Int Cl (Ed.6): F41G

Other: ONLINE: WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	GB 2107835 A	SFIM	1 to 7
X	GB 1563094	EMI	1 to 7
X	GB 1419471	ELTRO	1 to 7
X	EP 0261091 A2	BOFORS	1 to 7
X	US 4202246	GENERAL DYNAMICS	1 to 7
X	US 4015258	NORTHROP	1 to 7

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Y Document indicating lack of inventive step if combined with one or more other documents of same category.
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E Patent document published on or after, but with priority date earlier than, the filing date of this application.